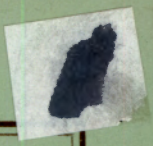


STATE OF OHIO

FRANK J. LAUSCHE, Governor

DEPARTMENT OF NATURAL RESOURCES

A. W. MARION, Director

DIVISION OF GEOLOGICAL SURVEY

JOHN H. MELVIN, Chief

Information Circular No. 7

Division of Geological Survey

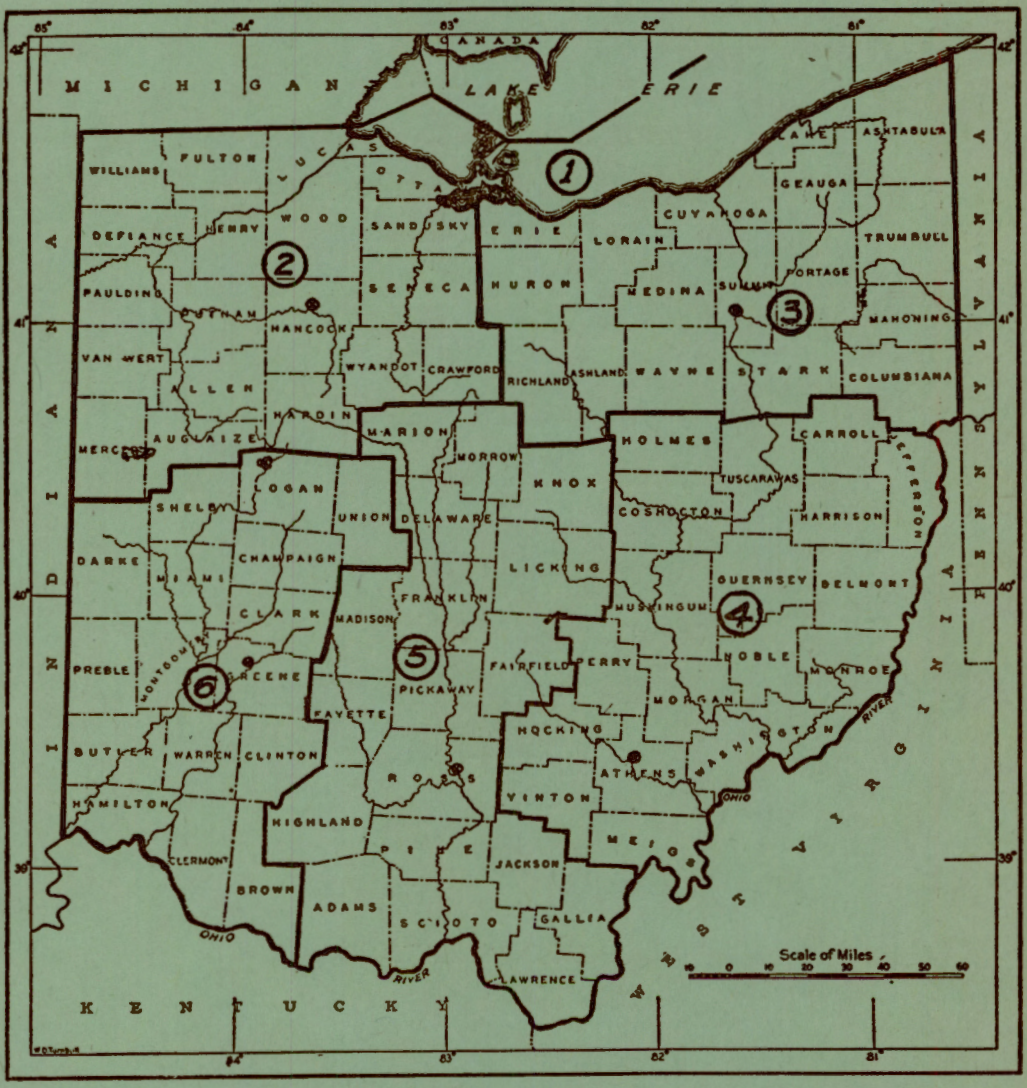
Annual Report

1951

by

JOHN H. MELVIN

Reprinted from ANNUAL REPORT of the Director
DEPARTMENT OF NATURAL RESOURCES
For the Period July 1, 1950 to June 30, 1951



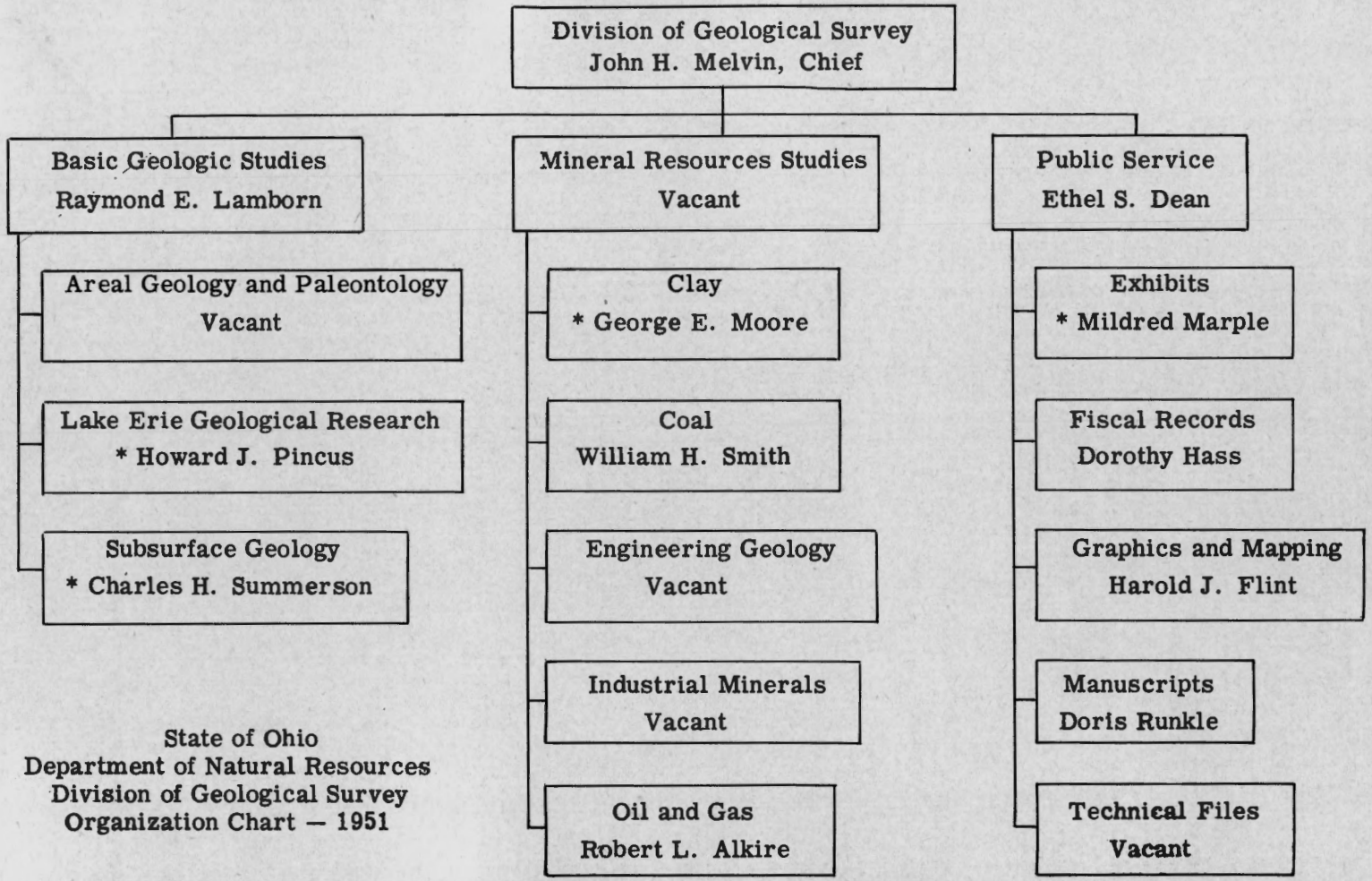
DISTRICT OFFICES

District	Location
No. 1	Fisheries Bldg., Sandusky, Ohio
No. 2	U. S. Route 25, Findlay, Ohio
No. 3	R. R. No. 5, Akron, Ohio
No. 4	172 N. Lancaster St., Athens, Ohio
No. 5	Savings Bank Bldg., Chillicothe, Ohio
No. 6	R. R. No. 3, Xenia, Ohio

ANNUAL REPORT

DIVISION OF GEOLOGICAL SURVEY

JOHN H. MELVIN, *Chief*



State of Ohio
Department of Natural Resources
Division of Geological Survey
Organization Chart — 1951

* Part-time

ORGANIZATION

In the General Code of Ohio the Division of Geological Survey is directed "to investigate, survey, interpret, and report matters relating to the geological or mineralogical conditions of the state, or to technologies pertaining to them, to the end that industry, commerce, education, public health, and recreation may be advanced."

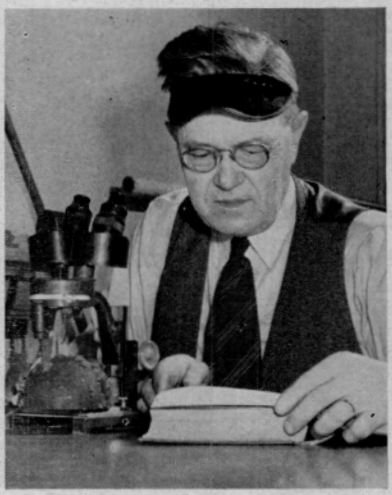
The amount of such work which can be done each year depends upon Legislative appropriation of funds. During the fiscal year 1950 the Division expended $70,383.31, and during 1951, $70,622.19.

It is apparent therefore that 1951 operations were of the same magnitude as those carried on in 1950.

In accomplishing its work the Division relies on a small, full-time staff of trained scientists and in addition, during the summer months, draws heavily on college professors and advanced students for additional research work. During the past year the staff consisted of twelve full-time and twenty-five seasonal or part-time employees.

The main office of the Division of Geological Survey is in Orton Hall on the Ohio State University campus, where it has been located for over half a century. There the staff of technically trained specialists is available to serve all who are interested in industrial development, public improvement, and the conservation of natural resources.

BASIC GEOLOGICAL STUDIES



R. E. LAMBORN, *Asst. Chief*
Basic Geological Studies

BASIC GEOLOGICAL STUDIES

The prime function of the Division of Geological Survey is to assist in the development and wise use of the state's mineral resources. The first step in such a program is the accumulation of many scientific facts which form the basis for practical applications of geologic knowledge. The survey has long been active in scientific research as a part of its responsibility to the citizens of the state and although the search for scientific truth is time consuming, many long range projects are gradually increasing our fundamental knowledge of Ohio geology.

In addition to its full time staff, the survey is fortunate in obtaining, during the summer months, the services of outstanding geologists and students from colleges and universities to carry on these basic scientific studies. During 1951, progress was made in the following projects:

1. **Adams County Geology.** Field work in Adams County has been carried on by the Survey, and by others, since 1837. By 1930, Professor Lewis G. Westgate of Ohio Wesleyan University had practically completed a manuscript on this area, but it never reached the publication state. The present State Geologist is reworking this data and bringing it up to date with the hope that a bulletin on the area can be prepared.

2. **Athens County Geology.** For several summers, Dr. Myron Sturgeon of Ohio University has been directing studies of the geology of Athens County. This year he was assisted by Mr. Merrill Aukland of Rutgers and Mr. Gilbert Smith of West Virginia University.

3. **Coshocton County Geology.** Mr. Raymond Lamborn of the Survey staff has been studying the geology of Coshocton County for a number of years. Field work is practically complete and a geologic map has been published. Work is progressing on a bulletin describing the results of this work.

4. **Gallia County Geology.** Mr. Oliver D. Blake of the Geology Department at the Ohio State University worked on the geology of Gallia County during the summer of 1950. During the year, Mr. Robert L. Wilson of the State University of Iowa completed a Master's thesis on Addison and Springfield Townships of this county.

5. **Hocking County Geology.** Mr. John F. Hall of the Geology Department at the Ohio State University worked on the geology of southern Hocking County during the summer. Dr. William Merrill of Ohio State University completed a Doctorate thesis on the northern half of the county in 1950 and it is planned to combine the work of Hall and Merrill into a county bulletin. During the year Mr. James Hohler completed a Master's thesis on the geology of Perry Township of Hocking County.

6. **Lucas County Geology.** Dr. J. Earnest Carmen of the Geology Department at the Ohio State University has been working on geologic problems of northwestern Ohio for many years. One result of this study will be a bulletin on the geology of Lucas County. Progress was made during the past summer both on paleontological problems and preparations of the manuscript.

7. **Monroe County Geology.** Dr. A. T. Cross, formerly of the University of Cincinnati, and now with the West Virginia Geological Survey, has been in charge of Monroe County geological studies for a number of years. During the past year, in cooperation with the West Virginia Survey, a field conference was held of geologists concerned with problems of the area. Field work is now practically completed and progress is being made on map and manuscript. During the year Mr. Thomas Arkle of the Ohio State University completed a Master's thesis on Switzerland Township of Monroe County.

8. **Morgan County Geology.** Mr. Donald Norling of the Geology Department of the Ohio State University is preparing a report on the geology of Morgan County. Field work has been completed and work is progressing on map and manuscript,

9. **Perry County Geology.** Dr. Norman K. Flait, of the Geology Department at the University of Pittsburgh has completed his work on the geology of Perry County. The geologic map was published several years ago and the bulletin is now in press.

10. **Stark County Geology.** Dr. William Rice of Mount Union College is making a study of the geology of Stark County, but because of other committments did not undertake field work during 1950.

11. **Tuscarawas County Geology.** Mr. Raymond Lamborn of the Survey staff has been working on the geology of Tuscarawas County for a number of years. Each year additional data on oil, gas, coal, clay, etc. is obtained.

12. **Washington County Geology.** Dr. A. T. Cross, Dr. Gerald Bell, and Mr. William Smith have practically completed field work on the eastern half of Washington County Very little has yet been done on the western half, however.

13. **Geology of the Mississippian Formations of Ohio.** Dr. J. E. Hyde spent many years, before his death, in work on the Mississippian rocks of the state. Dr. Mildred Morple of the Ohio State University has been editing his manuscripts and it is planned to issue a memorial volume to Dr. Hyde at an early date. Mr. Sanford Fagadan of the Geology Department at Ohio State is also engaged in studies of Mississippian paleontology, as is Mrs. Anita Bowen.

14. **Geology of the Monongahela Formation of Ohio.** Dr. Wilbur Stout, former State Geologist, had prepared a voluminous manuscript on the Monongahela of Ohio before his retirement. Editorial work and map preparation is progressing on this project.

15. **Lake Erie Geologic Research.** The Divisions of Shore Erosion, Water, Wildlife, and Geological Survey of the Ohio Department of Natural Resources, and the Department of Geology, Graduate School, Research Foundation and Graduate School of the Ohio State University are cooperating on a comprehensive study of the geology of Lake Erie. During the past year, a 26 foot motor towboat has been converted into an efficient, shallow water research vessel, equipped with electronic echo-sounder, radio direction finder and especially designed sediment sampling rig. Some field work was done late in the summer of 1950 and extensive work will be undertaken during the summer of 1951.

16. **Subsurface Geologic Studies.** A knowledge of the geology and mineral resources which lie buried beneath the surface is gained by studying cores recovered from drained drilling operations and cuttings from oil, gas and water wells. Microscopic study, using a number of methods, gives information of great value to the geologist. During the past year, Dr. Charles Summerson has studied the insoluble residue of some of the Devonian limestones of central Ohio. It is planned to accelerate this work.

MINERAL RESOURCE STUDIES

WILLIAM SMITH
Coal

COAL

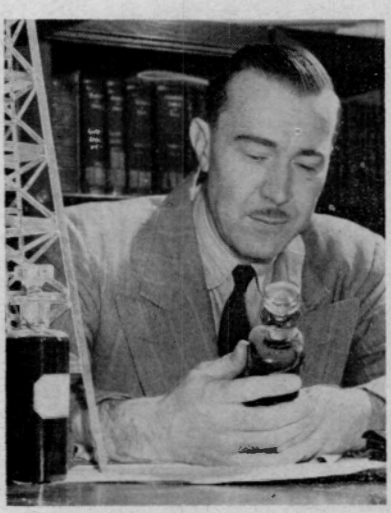
Coal accounts for over half of the state's total raw mineral production. In 1950 this production amounted to 36,977,932 tons.

17. **Collection of Basic Coal Data.** Accumulation of basic coal data is one of the major activities of the Coal Section. Information is obtained by measurement of outcrops and of exposures in mines, logging of drill holes, preparation of outcrop maps and analysis of samples. This information is then evaluated and interpreted in order to assist in the location of new prospecting areas and in future development of existing operations. Industry greatly assists in this work by supplying drill cores and logs, coal analyses, mine maps and samples for analysis.

18. **Coal Reserve Studies.** The determination of original and remaining coal reserves is basic to industrial development. Industry must know its fuel resources for many years in advance. Such inventory studies are constantly in process based on information which has been accumulating since 1837.

19. **Synthetic Liquid Fuel Studies.** Sooner or later liquid fuel will be manufactured from coal. If the present national emergency continues that time may not be far distant. For some time cooperative studies by the Engineering Experiment Station of the Ohio State University and the Survey have been advancing our knowledge of the properties of Ohio coals which may lend themselves to such an industry. A progress report has been prepared and will soon be published.

20. **Meigs Creek Coal Studies.** The benefication or improvement of low grade Ohio coal has been another cooperative project with the Engineering Experiment Station. The Meigs Creek, or No. 9 coal, contains very extensive unmined reserves in Ohio, and methods to improve this coal are being studied.



R. L. ALKIRE

Oil & Gas

OIL AND GAS

Oil and gas production for 1949 was valued at $20,934,110. In 1950, 1141 wells were reported drilled, of which 666 were successful and 475 resulted in dry holes; an average of 42% failures.

21. **Collection of Basic Oil and Gas Data.** Accumulation of basic data from the oil and gas industry is progressing. In all it is estimated that over 200,000 wells have been drilled in Ohio since the early 1860's. The Survey has records of over 25,000 and with the cooperation of industry and the United States Geological

Survey, is continually adding to its files. Such basic data is of use to the entire industry in the extension of existing oil fields, the discovery of new areas and the secondary recovery of oil and gas. It is also of great value in studying other underground mineral resources such as salt, brine, clay, stone, coal and gypsum.

22. **Annual Oil and Gas Report.** The Survey prepares an Annual Report of drilling activity in Ohio which indicates the new oil and gas which has been discovered during the year. Such information is invaluable in computing the reserves of these fuels remaining underground. The report for 1950 also included productivity and bibliography of the industry since its beginning in Ohio.

23. **Study of Cuttings.** Another activity of the oil and gas section is the collection, cataloging and study of the actual cuttings from selected wells. Much of our knowledge of the subsurface geology of Ohio is based on such studies.

24. **Oil and Gas in Perry County.** A report and maps on oil and gas development in Perry County has been prepared by Robert Alkire of the Survey staff, is in press, and should be available very soon.

CLAY AND CLAY PRODUCTS

25. **Clay in Perry County.** Field work on the clay resources of Perry County was carried on during the summer of 1950 by Dr. George Moore, of the Geology Department of the Ohio State University. It is planned to issue a clay resource map and report on this work.

ROCK AND ROCK PRODUCTS

The annual value of rock and rock products produced in Ohio is more than 90 million dollars. Limestone and dolomite were used in metallurgical fluxstone, glass making, chemicals, refractories, agricultural limestone, crushed stone for highways, railroad ballast and construction purposes. Ohio led all the states in the production of lime and was seventh in cement manufacture. Sandstone and conglomerate were used in glassmaking, refractories, whetstones, building material and foundry sand. Sand and gravel production was over 15 million dollars and was exceeded by only California and Illinois.

26. **The Limestones of Eastern Ohio.** Mr. Raymond Lamborn of the Survey staff has completed a study of the limestone of the

eastern part of the state. The work is in press and will be available by 1952. This will be a companion volume to "Dolomites and Limestones of Western Ohio" by Wilbur Stout, published in 1941.

27. **Limestone Fracture Studies.** Mr. A. R. Glockzin, formerly of the Department of Geology at the Ohio State University has worked on the fracturing or jointing of the limestone of the western part of the state. Work is continuing on this project.

28. **The Sharon Conglomerate.** Dr. J. Osborn Fuller of the Geology Department of the Ohio State University has been studying the origin and geologic occurrence of the Sharon Conglomerate in Ohio. This formation is an important source of industrial silica. During the past year Dr. Fuller was assisted by Mr. John Pedry who completed a Master's thesis in the Sharon area of northeastern Ohio.

SALT AND BRINE

Only two states produce more salt than Ohio. Salt is derived from two sources: from brine, which is sea water modified during long burial in the rocks, and from beds of rock salt. The production figures do not distinguish between the two sources. Early salt production in Ohio was from natural brines, and these still supply a a part of the production. The larger production now comes from deeply buried beds of rock salt which are mined by dissolving the salt water pumped into the deposits, the salt being recovered from solution or the solution used directly in chemical manufacture.

Salt in natural or artificial brines is the basis of a great chemical industry producing soda ash, sal soda, caustic soda, sodium bicarbonate, sodium sulfate, chlorine, hydrochloric acid, and many other chemicals, most of which are in turn used as basic materials for further elaboration. Salt and limestone are the foundation rocks of Ohio's great chemical industry.

29. **Brine Analyses.** During the past year the Survey has continued to collect and analyze brine samples from various parts of the state. Industry has been very cooperative in assisting with this work. The first printing of Bulletin No. 37, "Brines of Ohio," has become exhausted and a second printing is now in press. Mr. Raymond Lamborn of the Survey staff has completed a supplementary report on additional brine analyses. This is also in press.

30. **Subsurface Exploration for Salt.** The Survey has been following closely and assisting in exploratory efforts to locate a thick deposit of rock salt in northeastern Ohio. If suitable beds are located by core boring, it is possible that Ohio may one day have a salt mine similar to those of Michigan and New York.

ETHEL S. DEAN
Public Service
Section

HAROLD J. FLINT
Graphics &
Mapping

DORIS RUNKLE
Manuscript

PUBLIC SERVICE

The Geological Survey is a public information bureau in matters relating to mineral resources and earth science. Approximately one-third of the time of the entire staff is spent in answering inquiries by letter, telephone and personal conference. The Survey is always ready to assist in the development and conservation of mineral resources and to serve the citizens of the state.

31. **Geography of Ohio.** Professor Alfred J. Wright of the Geography Department of the Ohio State University has been working for some time on a new geography of Ohio. The manuscript is now complete and work is progressing on illustrations.

32. **Exhibits.** The Division had a part in the Department of Natural Resources exhibit at the Ohio State Fair and at several of the Sportsmen's shows. Assistance has also been given in the preparation of geological exhibits in various buildings on the Ohio State University campus.

33. **Public Information Service.** By the preparation of articles and the presentation of talks before various organizations, schools, and interested groups, the Survey has furnished information on the geology and mineral resources of the state.

PUBLICATIONS

DIVISION OF GEOLOGICAL SURVEY PUBLICATIONS

Reports of Investigation:

7. Shore Erosion on Sandusky Bay; Paul R. Shaffer.
8. Part I. Oil and Gas Well Drilling Statistics for 1950. Part II. Oil and Gas Production, History, Regulation, Secondary Recovery and Bibliography; Robert L. Alkire and others.

Information Circular:

6. Division of Geological Survey Annual Report 1950; John H. Melvin. (Reprint from Annual Report of the Director, Department of Natural Resources, State of Ohio, 1950.)

Miscellaneous:

Guide book for Pennsylvania—Permian Field Trip (Prepared in cooperation with the West Virginia Geological Survey;) A. T. Cross, W. H. Smith and T. V. Arkle.

ARTICLES BY SURVEY STAFF PUBLISHED BY OTHER ORGANIZATIONS

Further Studies of Ohio Coals and Oil Shales; Part II. Ohio Coals; William H. Smith, The Ohio State University, Engineering Experiment Station Bulletin No. 143, May, 1951.

The State Geological Survey; John H. Melvin, Chapter in the 1950 American Yearbook.

Oil and Gas Developments in Ohio During 1950—Statistics of Oil and Gas Development and Production; A. I. M. E.

Developments in Ohio in 1950; R. L. Alkire—Review of Exploration and Developments in 1950, A. A. P. G.

Ohio—Oil and Gas Development 1950; R. L. Alkire—Oil and Gas Field Development in United States, Year Book 1950, National Oil Scouts & Landmens' Association.

Report on Oil and Gas Well Drilling Activity in Ohio, January 1, 1951 to July 1, 1951; R. L. Alkire, Bulletin Number 29-A Facts About Ohio Series, Industrial Development Department of the Ohio Chamber of Commerce.

Building Stones of Ohio; Doris Runkle, Ohio Chamber of Commerce Natural Resource Publication No. 8, November, 1950.

Chemical Limestones; Doris Runkle, Ohio Chamber of Commerce Natural Resource Publication No. 9, March, 1951.

How You Can Strike It Rich; Doris Runkle, Article in the Ohio

Conservation Bulletin, March, 1951.
Mineral Resources, John H. Melvin, Chapter on Ohio, An Empire within an Empire, Ohio Development and Publicity Commission, 1950.
The Geology of Switzerland Township, Monroe County; Thomas Arkle, Jr. Thesis presented for the Master of Arts Degree, The Ohio State University, 1950.
The Geology of Salem Township, Washington County; Gerald Bell, Thesis presented for the Master of Science Degree, The Ohio State University, 1950.
The Geology of Perry Township, Hocking County; James Joseph Hohler, 1950.
The Geology of Chagrin Falls Township, Cuyahoga County and Bainbridge Township, Geauga County; John J. Pedry, Thesis presented for the Master of Science Degree, The Ohio State University, 1951.

FINANCIAL STATEMENT

The following is a statement of funds available and expenditures for the fiscal year beginning July 1, 1950 and ending June 30, 1951:

JOHN H. MELVIN, Chief

H. B. 654		Annual Appropriations	Vouchers Issued	Unexpended Balance
A-1	Salaries	$41,953.33	$41,941.65	$ 11.68
A-2	Wages	3,989.00	3,969.38	19.62
C-4	Office Supplies	300.00	288.95	11.05
C-4a	Postage	375.00	375.00	------
E-1	Office Equipment	3,713.69	3,706.72	6.97
E-9	Tools and Machinery	150.00	150.00	------
F-1a	Other Repairs	100.00	98.80	1.20
F-5	Express	50.00	30.46	19.54
F-6	Travel	5,000.00	4,996.60	3.40
F-7	Communication	180.00	180.00	------
F-8	Publications	8,075.77	8,053.57	22.20
F-9	Other	2,061.00	2,041.75	19.25
F-9a	Oil and Gas Log	4,500.00	4,489.82	10.18
	Total	$70,447.79	$70,322.70	$125.09

H. B. 655	Remainder Appropriations Fiscal Year 1950		
Betterments and Improvements	$299.49	$299.49	------

Income from sales of bulletins, maps, photostats, etc., was $1,237.87 for the fiscal year 1951. This money is paid directly into the General Receiving Fund.

Conservation Pledge

I GIVE MY PLEDGE
AS AN AMERICAN
TO SAVE AND FAITHFULLY TO
DEFEND FROM WASTE
THE NATURAL RESOURCES OF
MY COUNTRY — ITS SOIL
AND MINERALS, ITS
FORESTS, WATERS,
AND WILDLIFE